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A new harlequin frog from the Cordillera Oriental of Colombia (Anura, Bufonidae, *Atelopus*)

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A new species of *Atelopus* is named from cloud forests on the western flank of the Cordillera Oriental of Cundinamarca, Colombia. The new species is patternless, but appears allied to *A. pedimarmoratus* Rivero, 1963 and *A. subornatus* Werner, 1899. *Atelopus echeverrii* Rivero & Serna, 1986 is treated as a synonym of *A. subornatus*. Those species of *Atelopus* that lack the terminal phalange of the thumb are proposed to compose the *flavescens* group, whereas those species that retain the terminal phalange are placed in the *ignescens* group.

INTRODUCTION

Harlequin frogs of the genus *Atelopus* are remarkably uniform in morphology (MCDIARMID, 1971; PETERS, 1973) and are notable for their occasional complex color pattern variation (PETERS, 1973; SAVAGE, 1972). Although three species groups are mentioned by FROST (1985), most of the 45 or so described species have not been assigned to any of the three groups (i. e., *flavescens*, *ignescens*, and *longirostris* groups).

The most widely cited authority for species groups is PETERS (1973) who explicitly termed his groups as phenetic and units of convenience. PETERS' groups were based on body shape and limb length (an *ignescens* group for taxa having "short, stocky bodies with short limbs" and a *longirostris* group for those taxa described as "slim-bodied, long-legged"). Consistent with his claim that these were not phylogenetic groups, PETERS assigned the 15 species he recognized in Ecuador to the *ignescens* group (7 species, including one no longer placed in *Atelopus*) and the *longirostris* group (6 or 7 species, if *mindoensis* was included) with *A. boulengeri* and *A. mindoensis* as "intermediates". A few

additional species have been assigned to the short-limbed and long-limbed groups (CANNATELLA, 1981; GRAY & CANNATELLA, 1985; LA MARCA, 1983; LA MARCA et al., 1990; RUEDA-ALMONACID & HOYOS, 1991; RUIZ-CARRANZA et al., 1988) based on body proportions. The other species groups assignments were by LESCURE (1973) who recognized a *flavescens* group for those species in which the first toe is hidden and MCDIARMID (1973) who recognized "a natural group" for the three species having internal tympani and middle ears (no name was applied to this group).

The cloud forests of the western slopes of the Cordillera Oriental of central Colombia have been destroyed to create pastureland and some farms. These cloud forests have been collected sporadically and harbor a rich amphibian fauna. WERNER (1899) named *Atelopus flaviventris* and *A. subornatus* from the Fusagasuga-Sibaté region based on females and males, respectively, of the same species (LÖTTERS, 1989). RIVERO (1963) designated a single specimen from this region as a paratype of *Atelopus nicefori* (known otherwise from the northern part of the Cordillera Occidental of Colombia) and was followed in this assignment by COCHRAN & GOIN (1970). Later, RIVERO & SERNA (1986) named this individual as *Atelopus echeverrii*. Some small forest patches remain and, in October 1985, the author was permitted to collect frogs in one patch near the town of Albán. Two species of *Atelopus* occur in this forest: one was found sporadically along all streams worked, whereas the other was found only along the large stream and only in the immediate vicinity of a waterfall. The less common species is similar to *Atelopus longirostris* and is under study by Pedro M. RUIZ. The abundant species is structurally similar to *A. subornatus* (proportions, morphology of hands and feet), but differs in color pattern and in the development of dorsolateral rows of warts. It is described here as a new species.

MATERIALS AND METHODS

Measurements were taken with dial calipers under a dissecting microscope. Data on skeletons were obtained from doubly stained and cleared specimens (DINGERKUS & UHLER, 1977) or from dissections of preserved individuals. Dry skeletons are less useful because of possible damage to phalanges. Even interpretation of cleared-and-stained specimens requires some caution; terminal phalanges are less mineralized and can be difficult to see (this is less a problem with doubly stained specimens). Specimens studied are identified below by number and museum acronym as follows: FMNH, Field Museum of Natural History, Chicago, Illinois; ICNMHN, Instituto de Ciencias Naturales, Museo de Historia Natural, Universidad Nacional de Colombia, Bogotá; and KU, Museum of Natural History, The University of Kansas, Lawrence, Kansas. Means are reported ± one standard error.

Atelopus farci sp. nov.

(fig. 1 C-D)

Holotype. – ICNMHN 14488, adult male, one of a series collected in the forest immediately west of Granja Infantil El Gran Cuidadano Padre Luna, vereda Tres Marias,

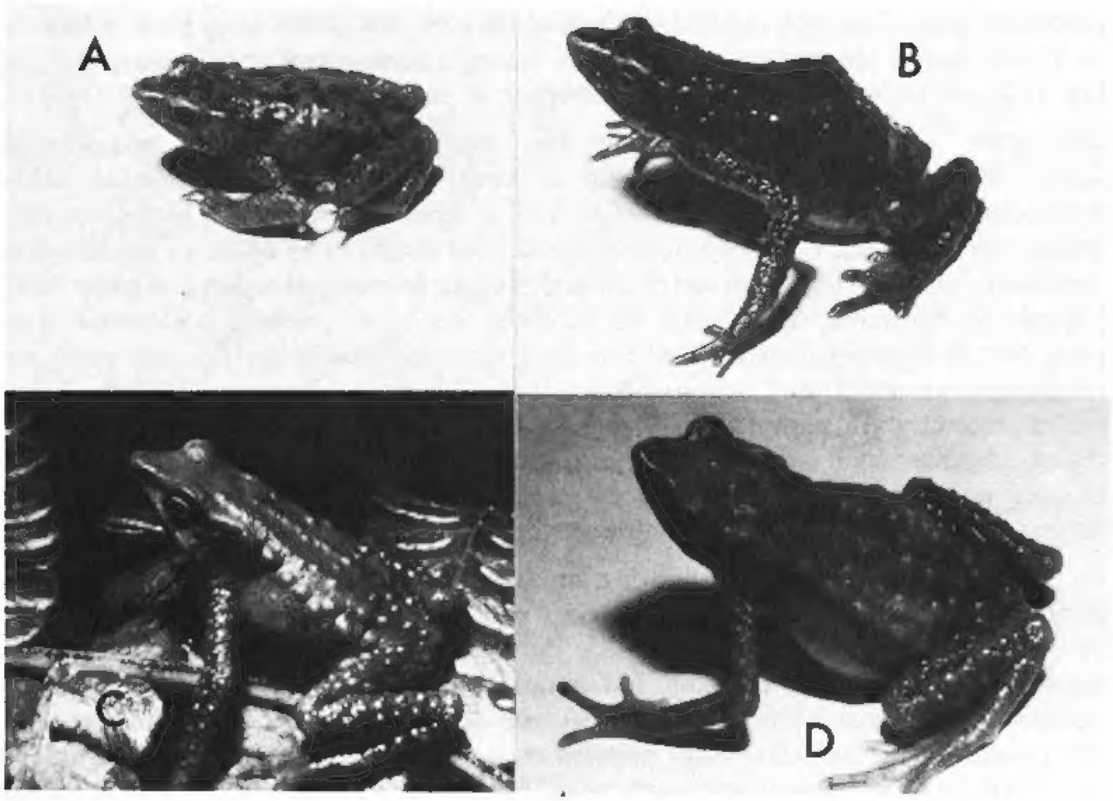

Fig. 1. – (A) *Atelopus subornatus*, male, ICNMHN 12823, 26.4 mm SVL; (B) *A. subornatus*, female, ICNMHN 12824, 38.4 mm SVL; (C) *A. farci*, male holotype, ICNMHN 14488, 27.3 mm SVL; (D) *A. farci*, female, ICNMHN 14490, 36.4 mm SVL. From kodachromes by the author.

Municipio Albán, Departamento Cundinamarca, Colombia, 2090 m elevation, 19 October 1985 by John D. LYNCH and Juan M. RENJIFO.

Paratypes. – ICNMHN 14489-14533, collected syntopically.

Diagnosis. – A moderate-sized (males 26.9-30.2 [$\bar{x}$ = 28.6 ± 0.1, N = 44] mm snout-vent length) short-limbed (tibia length/standard distance equals 42.5-47.2 % [$\bar{x}$ = 44.5 %]) member of the *Atelopus flavescens* group[1] having reduced webbing of the foot (toes about one-half webbed) and a dorsolateral row of enlarged warts; adults uniform in color (dorsum olive without darker markings, throat and venter not spotted or patterned).

1. *Note of the editor.* – Merging of the former *flavescens* and *longirostris* groups into a single group (see "Discussion" below) requires the use for this taxon of the name "*Atelopus flavescens* group". In its more recent version (1985), the *International Code of Zoological Nomenclature* clearly provides rules for the nomenclature of infrasubgeneric supraspecific groupings of species, which are called "aggregates of species" in Art. 6b, and for which Art. 23i states that the Principle of Priority applies. Therefore, any such group of species should be named after the first-named member of this aggregate (like in examples of Art. 6b of the *Code*), not after another one (such as the "best known" or the most widely distributed one). In this case, the name *flavescens* (1841) has priority over the name *longirostris* (1868). [Alain DUBOIS].

Atelopus farci is most similar to *A. echeverrii*, *A. nicefori*, *A. pedimarmoratus*, and *A. subornatus* (short legs with reduced webbing of the toes), but differs from these in lacking dark markings on the dorsum and venter, in having a dorsolateral row of enlarged warts (fig. 1C), and in being larger than *A. nicefori* or *A. pedimarmoratus*.

Description. – Head slightly narrower than body; head longer than wide; snout acuminate, protruding beyond lower jaw in dorsal and lateral views; nostrils weakly protuberant, directed laterally, situated at level of apex of lower jaw; canthus rostralis distinct, weakly concave from eye to nostril and from nostril to tip of snout; loreal region weakly concave; lips not flared; top of snout depressed; interorbital region and occiput flat (except for tubercles, see below); no tubercles on upper eyelids; postorbital crest prominent, a short pretympanic crest extending ventrally from its anteriormost point; no tympanum (nor middle ear); temporal region vertical, bearing 6-8 rounded tubercles (most ventral tubercles are postrictal); 2-6 rounded tubercles on occiput and in interorbital region; choanae small, round, widely separated; tongue 2 1/2 times as long as wide, broadest posteriorly, free for 1/2 its length posteriorly; ostia pharyngea absent; vocal slits present (usually on both sides, sometimes on one side only).

Dorsal surfaces smooth and bearing large rounded warts (fig. 1); largest warts form dorsolateral series – first 2 or 3 form a ridge confluent with postorbital crests, followed by 5-7 warts along upper edge of flanks; dorsolateral warts narrowly separated from one another (occasionally touching, less frequently fused); smaller (about one-half size of dorsolateral warts) warts on dorsum between dorsolateral series, more numerous on lower back; distinct vertebral ridge between occiput and sacrum; warts small or absent on flanks; small warts on upper surfaces of limbs; skin on top of foot smooth; small warts on top of hand but not fingers; throat, chest, sides of belly, undersides of arms granular; skin below vent areolate; skin of belly finely areolate or wrinkled; cloaca opening in a short, inconspicuous tube, lacking tubercles, directed posteriorly at midlevel of thighs.

Fingers basally webbed, lacking lateral fringes, webbing most distinct between I and II; thenar and subarticular tubercles indistinct (basal subarticular tubercles of III and IV more distinct); palmar tubercle large, round; no distinct supernumerary palmar tubercles; thumb of male flexed so that digit I appears shortened (fig. 2); dorsal and posterodorsal surfaces of digit I bearing fine spinules (cornified nuptial excrescence); digit tips (II-IV) with round pads (neither expanded nor defined by grooves).

Distal half of inner edge of tarsus with thickened fold; inner metatarsal tubercle indistinct (except for paler coloration), slightly larger than more pungent, oval, outer metatarsal tubercle; no supernumerary plantar tubercles; subarticular tubercles low, inconspicuous (paler than surrounding skin); digital pads distinct; webbing extending as fringe to tips of each toe, incised except between I and II (fig. 2); webbing formula (following MYERS & DUELLMAN, 1982) **I** 0 – 1 **II** 0 – 1 1/2 **III** 0 – 3 **IV** 3 – 1 **V**; fleshy fringe along median surface of digit I and lateral surface of digit V.

Coloration in preservative: dull olive-brown with paler dorsolateral warts and postorbital crests; tips of toes, belly, underside of forearm, and tubercles of hand and foot cream; concealed surfaces of thighs and shanks dusky olive-brown; throat, chest, undersides of limbs stippled with brown.

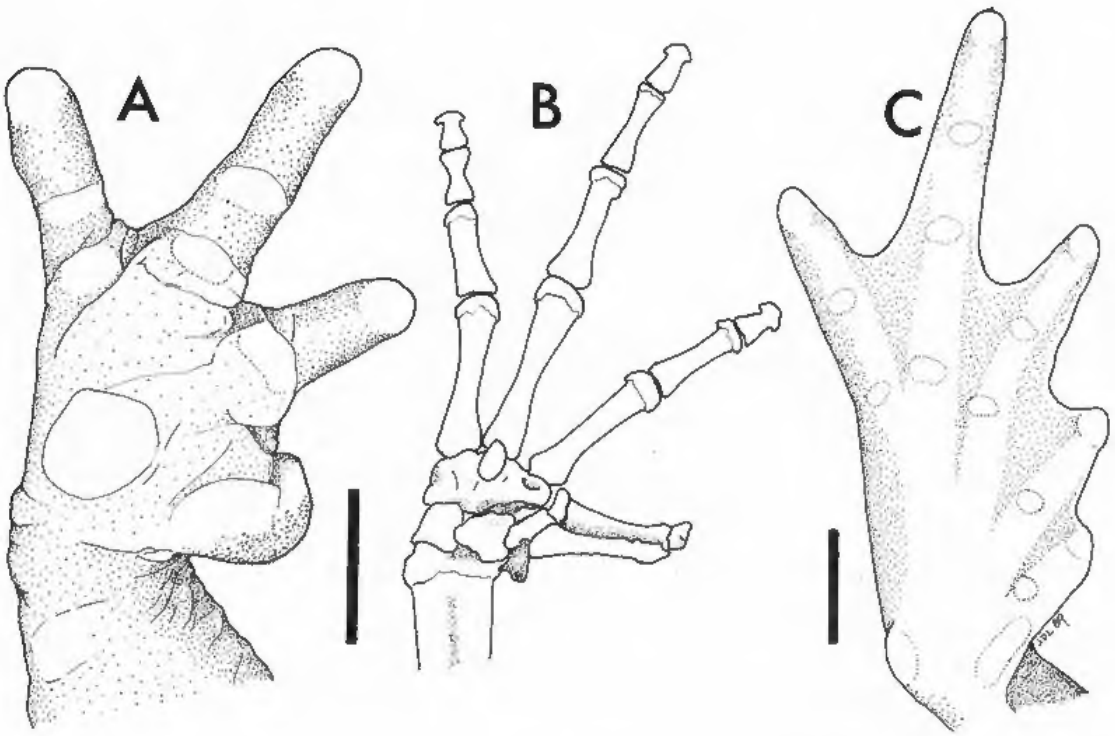

Fig. 2. – *Atelopus farci*: (A) palmar view of hand, ICNMHN 14519; (B) palmar view of skeleton of hand, ICNMHN 14533; (C) plantar view of foot, ICNMHN 14514. Scales equal 2 mm.

In life, body olive with slightly paler warts along dorsolateral region; flanks slightly darker olive (fig. 1); tips of digits yellow; in males, throat gray, belly blue-gray; in females, venter yellowish-olive; iris dark green except for luminescent green ring around pupil.

Measurements of holotype (in mm). – SVL (snout to vent length) 27.3; SD (standard distance = snout to tip of coccyx) 25.6; knee to knee 23.3; shank 11.8; foot (base of inner metatarsal tubercle to tip of Toe IV) 11.5; chord of HL (head length) 9.2; HW (head width) 8.3; eye length 2.5; E-N (eye to nostril distance) 2.5; ES (eye to snout tip) 4.3; IOD (interorbital distance) 2.7; upper eyelid width 2.3; internarial distance 2.9.

Proportions. – To facilitate comparisons with PETERS (1973), some proportions are expressed in terms of SVL as well as SD. Males (all proportions have N = 36): SVL 26.9-30.2 mm ($\bar{x}$ = 28.6 ± 0.1, N = 44); SD 25.4-29.2 ($\bar{x}$ = 26.9 ± 0.1, N = 44); shank/SVL 0.40-0.44 ($\bar{x}$ =0.42 ± 0.002); HW/SVL 0.27-0.30 ($\bar{x}$ = 0.28 ± 0.001); shank/SD 0.42-0.47 ($\bar{x}$ = 0.44 ± 0.002); HW/SD 0.27-0.32 ($\bar{x}$ = 0.30 ± 0.002); HW/HL 0.84-0.92 ($\bar{x}$ = 0.88 ± 0.004); HL/SD 0.30-0.36 ($\bar{x}$ = 0.34 ± 0.002); E-N/eye length 0.71-1.09 ($\bar{x}$ = 0.92 ± 0.014); E-S/eye 1.32-1.92 ($\bar{x}$ = 1.62 ± 0.02); eyelid/IOD 0.61-1.04 ($\bar{x}$ = 0.87 ± 0.014); foot/SVL 0.37-0.43 ($\bar{x}$ = 0.40 ± 0.002). Only two females are available (SVL = 36.1-36.4 mm, SD of each 34.0). Their proportions are: shank/SVL 0.41-0.43; HW/SVL 0.26; shank/SD 0.44-0.46; HW/SD 0.28; HW/HL 0.83-0.86; HL/SD

0.32-0.34; E-N/eye length 0.91-1.07; E-S/eye 1.59-1.86; eyelid/IOD 0.76-0.85; foot/SVL 0.40-0.42.

All individuals collected were sitting on vegetation near the forest floor or on rocks within 2 m of a swift stream. The area is very moist because the forest occurs adjacent to a 20-m waterfall that throws fine spray well down the stream channel. One pair (ICNMHN 14489-90) was found in amplexus but other individuals (including another female) were sitting on leaves, twigs, and rocks. Tadpoles of this species were abundant on and under rocks in the stream. Pedro M. RUIZ will include a description of these tadpoles in his forthcoming review of tadpoles of Colombian *Atelopus*.

Etymology. – The species name is an arbitrary combination of letters and coincidentally the acronym for a guerilla group in Colombia (FARC) that frequents forests (especially cloud forests) and is dressed in khaki. Although FARC disrupts Colombian society, it does provide protection to the endangered cloud forests and their non-human inhabitants. The species is dedicated to FARC for its conservation, but not political, efforts.

DISCUSSION

The description of *Atelopus farci* resulted in part from study of several holotypes of Colombian species of *Atelopus* in an effort to associate several names with populations that had been sampled by Pedro M. RUIZ. In the course of these comparisons, it became obvious that *A. echeverrii* and *A. pedimarmoratus* had been named because of confusion about the morphology of *A. subornatus*. RIVERO (1963: 122) distinguished *A. pedimarmoratus* from *A. subornatus*, in part, because the former has "considerably less" toe webbing. Actually, the two have equal amounts of toe webbing (types of *A. subornatus* redescribed by LÖTTERS, 1989). *Atelopus echeverrii* differs from *A. pedimarmoratus* in precisely the same ways that *A. subornatus* differs from *A. pedimarmoratus*, but RIVERO & SERNA (1986) contrasted *A. echeverrii* with the smaller *A. nicefori*, with which it had been confused previously (COCHRAN & GOIN, 1970; RIVERO, 1963). All details of the structure (except the E-N/eye length ratio, see Table I) and color pattern of the holotype of *Atelopus echeverrii* match the data for the syntypes of *A. subornatus* (LÖTTERS, 1989) and series of freshly collected specimens from the Quebrada Agua Bonita (LYNCH, 1986). *Atelopus pedimarmoratus* is a smaller frog having large pale spots on the throat, venter, and undersides of the legs and a large pale patch on the lower flanks but it lacks the low warts on the flanks seen in *A. subornatus*. In the absence of apparent differences, *Atelopus echeverrii* Rivero & Serna, 1986 is here placed in the synonymy of *Atelopus subornatus* Werner, 1899.

Based on proportions, it might appear most appropriate to assign *A. farci* to PETERS' *ignescens* group. In reviewing PETERS' (1973) treatment of *Atelopus*, I considered briefly that the freedom of the thumb (from the fleshy palm and webbing) might be a useful character with which to group taxa. A free thumb versus a short thumb does not seem to sort taxa especially well, but I did notice that several of the species of PETERS' *ignescens* group had a longer thumb than did several species of his *longirostris* group (independent

Table I. – Sizes and proportions (as percents) for male *Atelopus farci*, the holotype of *A. echeverii* (FMNH 81875), and male *A. subornatus*. Values given are Range, Mean ± One standard error.

	A. farci ♂♂ (36)		*A. echeverrii*	*A. subornatus* ♂♂ (10)	
SVL	26.9-30.2	28.6 ± 0.1	28.9	25.9-29.4	27.7 ± 0.3
SD	25.4-29.2	26.9 ± 0.1	27.5	25.0-27.9	26.3 ± 0.3
Shank/SVL	39.79-43.84	41.9 ± 0.2	37.02	36.33-40.38	38.1 ± 0.4
HW/SVL	26.74-30.40	28.6 ± 0.1	29.06	26.26-30.50	29.7 ± 0.6
Shank/SD	42.46-47.23	44.5 ± 0.2	38.91	37.83-42.46	40.2 ± 0.4
HW/SD	27.40-32.42	30.3 ± 0.2	30.54	27.76-34.21	31.3 ± 0.6
HW/HL	83.70-92.13	88.2 ± 0.4	86.60	82.65-93.81	88.8 ± 0.9
HL/SD	30.00-35.94	34.3 ± 0.2	35.27	32.97-39.16	36.0 ± 0.5
E-N/eye	70.97-108.7	91.8 ± 1.4	92.59	74.07-88.46	82.5 ± 1.4
E-S/eye	132.26-191.16	162.1 ± 2.1	166.67	141.38-173.08	159.6 ± 3.4
Eyelid/IOD	60.61-104.16	86.8 ± 1.4	82.76	68.75-100.0	89.3 ± 3.7
Foot/SVL	37.41-43.00	40.4 ± 0.2	38.41	37.05-42.14	40.0 ± 0.6

of the relative "freedom" of the thumb). I dissected individuals and discovered that thumb length corresponded with the number of phalanges in the thumb (2 versus 1). In several species from Colombia, the thumb appears to be exceptionally short, almost as if the last segment were flexed (fig. 2A).

McDIARMID investigated phalangeal formulae in *Atelopus* and reported (1971: 29): "There is a reduction in the number and length of the phalanges in the first digit in *Atelopus*. Several species exhibit the typical 2-2-3-3 formula, but specimens of several species have only a single unit in digit 1 giving a formula of 1-2-3-3. In some specimens the formula is 1-2-3-3 in one hand and 2-2-3-3 in the other. Apparently there is a trend towards reduction in length and ultimate loss of the phalanges in the first digit of some species of *Atelopus*."

Unfortunately, McDIARMID did not report the details of his observations and we are left with a descriptive summary that discourages search for a pattern in phalangeal formulae in *Atelopus*. The discovery that *Osornophryne* is regular in having a 2-2-3-2 formula (RUIZ-CARRANZA & HERNANDEZ-CAMACHO, 1976; but see HOOGMOED, 1987) and my discovery of an initial correspondence of 1-2-3-3 in PETERS' *longirostris* group and 2-2-3-3 in his *ignescens* group led me to consider that these poorly distinguished species groups might differ in phalangeal formulae and that McDIARMID's discouraging summary might reflect inadequate sample sizes and/or errors of observation. Although McDIARMID

(1971) reported that he had found individual variation in phalangeal formulae as well as intra-individual variation, I did not find either kind of variation in my study of *Atelopus*. At present, we don't know the frequency of such variation, its distribution, or its significance.

Limited published data are available. McDiarmid (1973) reported 1-2-3-3 formula in *A. vermiculatus* (= *A. flavescens* fide Lescure, 1976). Ruiz-Carranza & Hernandez-Camacho (1978) incorrectly reported 2-2-3-3 formula for *A. carauta* (I found 1-2-3-3 for each hand in their specimen and another individual). La Marca (1983) reported 1-2-3-3 formula for *A. sorianoi* (and by implication for *A. carbonerensis*, *A. cruciger*, and *A. oxyrhynchus*). Ruiz-Carranza et al. (1988) reported 1-2-3-3 formula for *A. minutulus*. I have not examined *A. oxyrhynchus* or *A. sorianoi* and accept La Marca's observations. The other taxa were examined by me.

Twenty-two species (and two others reported by La Marca, 1983) have the 1-2-3-3 formula (Table II). These represent the species known from the Amazonian lowlands as well as those from the Andes in Venezuela and some of those from the Andes of Colombia and Ecuador. Seventeen species have the 2-2-3-3 formula (Table II), including most species from Central America, both from the Sierra Nevada de Santa Marta, and most highland species from Colombia and Ecuador. For *A. carrikeri* and *A. ebenoides ebenoides*, phalangeal formulae were determined without dissection. Most of the species having the 2-2-3-3 formula can be so determined in preserved specimens without dissection of the specimen.

I lack data for *A. balios*, *A. erythropus*, *A. francisus*, *A. nicefori*, *A. pedimarmoratus*, *A. pinangoi*, *A. seminiferus*, *A. tamaensis*, *A. tricolor*, and *A. williami* but expect that most of these will prove to have 1-2-3-3 (based on published drawings and descriptions of the thumb).

The 2-2-3-3 formula is primitive among bufonids and is thus not informative within the *Atelopus* + *Frostius* + *Osornophryne* clade (Cannatella, 1986). Within the clade, three phalangeal formulae are known: 2-2-3-3 (17 *Atelopus* and *Frostius pernambucensis*), 2-2-3-2 (at least two *Osornophryne*), and 1-2-3-3 (24 *Atelopus*). However, Hoogmoed (1987) reported 1-2-3-2 in *O. antisana* and 1-2-3-3 in *O. guacamyo*. The first formula is otherwise not known in bufonids and the second is found in many *Atelopus*. McDiarmid's (1971) report of 1-2-3-3 and 2-2-3-3 formulae in different species of *Dendrophryniscus* (another "atelopoid" genus) is not immediately relevant if Cannatella's (1986) hypothesis about relationships is correct.

Conversion among states can be accomplished by fusion/loss/failure to ossify and seemingly could be accomplished "easily". That the conversion is easy to visualize does not mean or require that it occurred repeatedly (McDiarmid's, 1971, apparent conclusion). The occurrence of the 1-2-3-3 formula in *Osornophryne guacamayo* and 24 species of *Atelopus* is most parsimoniously viewed as convergence. In the absence of contrary data (aside from that of *O. guacamayo*'s 1-2-3-3 formula) and in order to construct a bolder hypothesis, parsimony requires that we view each transformation as having occurred only once.

If the 1-2-3-3 formula is a synapomorphy within *Atelopus*, the *flavescens* group (Lescure, 1973) is a part of Peters's *longirostris* group and its recognition as a coordinate

Table II. – Phalangeal formulae for the hands in the genus *Atelopus*. No intraspecific or intraindividual variation was seen and a single formula is provided for each species. Specimens were studied by dissection (most numbers), cleared and stained skeletons (**bold** numbers), or dry skeletons (*italicized* numbers).

F = phalangeal formula: 1 = 1-2-3-3; 2 = 2-2-3-3.

Name and author of species	Country	Specimen number	F
A. arthuri Peters, 1973	Ecuador	KU 108938	1
A. bomolochos Peters, 1973	Ecuador	KU 141518	2
A. boulengeri Peracca, 1904	Ecuador	KU 108940, KU 147078	2
A. carauta Ruíz-Carranza & Hernández-Camacho, 1978	Colombia	ICNMHN 3180, ICNMHN 16269	1
A. carbonerensis Rivero, 1972	Venezuela	ICNMHN 14384, KU 132862	1
A. certus Barbour, 1923	Panama	KU 116166, KU 116217	2
A. chiriquirensis Shreve, 1936	Panama	KU 104319, KU 108802, KU 108834, *KU 117384-91*	1
A. coynei Miyata, 1980	Ecuador	KU 164744	1
A. cruciger (Lichtenstein & Martens, 1856)	Venezuela	ICNMHN 14387, KU 185704, KU 185706	1
A. ebenoides marinkelli Cochran & Goin, 1970	Colombia	ICNMHN 347, KU 170104-06	2
A. elegans (Boulenger, 1882)	Colombia	ICNMHN unnumbered	1
A. farci sp. nov.	Colombia	ICNMHN 14519, ICNMHN 14533	1
A. flavescens Duméril & Bibron, 1841	French Guiana	KU 159617	1
A. glyphus Dunn, 1931	Panama	KU 94584-85, KU 94592, KU 94603	2
A. halihelos Peters, 1973	Ecuador	KU 209646	1
A. ignescens (Cornalia, 1849)	Ecuador	KU 117817-21, KU 122386-88, KU 122390-91, KU 131803, KU 132021, KU 132071, KU 132106-07, KU 164840, KU 170107-08, KU 178355	2
A. longibrachius Rivero, 1963	Colombia	KU 145046	1
A. longirostris Cope, 1868	Ecuador	ICNMHN 19145, KU 164746	1
A. lynchi Cannatella, 1981	Ecuador	KU 200241-42	2
A. mindoensis Peters, 1973	Ecuador	KU 166301-03	1
A. minutulus Ruíz-Carranza, Hernández-Camacho & Ardila, 1988	Colombia	ICNMHN 12898	1
A. mucubajiensis Rivero, 1972	Venezuela	KU 166666	1
A. muisca Rueda-Almonacid & Hoyos, 1971	Colombia	ICNMHN 21286	2
A. nepiozomus Peters, 1973	Ecuador	KU 108946	2
A. pachydermus (Schmidt, 1857)	Ecuador	ICNMHN 19149, KU 142955	2
A. palmatus Andersson, 1945	Ecuador	KU 142963	1
A. peruensis Gray & Cannatella, 1985	Peru	KU 181612, KU 181816-17, KU 181820	2
A. pictiventris Kattan, 1986	Colombia	ICNMHN 13593	1
A. planispinus Jimenez de la Espada, 1875	Ecuador	KU 209644	1
A. sanjosei Rivero & Serna, 1986	Colombia	ICNMHN unnumbered	1
A. senex Taylor, 1952	Costa Rica	KU 32314, KU 103544, KU 103551, KU 104336-38	2
A. spumarius Cope 1871	Ecuador	ICNMHN 19154, KU 129954	1
A. spurrelli Boulenger, 1914	Colombia	ICNMHN 2757	1
A. subornatus Werner, 1899	Colombia	ICNMHN 4157	1
A. varius (Lichtenstein & Martens, 1856)	Panama	KU 77682, *KU 96167, KU 153442, KU 172427*	2
A. walkeri Rivero, 1963	Colombia	ICNMHN 420	2
A. zeteki Dunn, 1933	Panama	KU 116237, KU 116240	2

taxon obscures relationships within *Atelopus*. LESCURE's (1973) evidence is sufficient to unite two species as sister species. MCDIARMID's (1973) "natural group" included the two species that LESCURE placed in the *flavescens* group plus *A. spumarius*. However, MCDIARMID's "natural group" is based on retention of a primitive character state. While it may be true that these three species are each others' nearest relatives, a plesiomorphy is not sufficient as evidence to support the claim. Recognizing a *flavescens* group (supported by an hypothesized synapomorphy) for both the former *flavescens* and *longirostris* groups requires the recognition of a group for the non-members (the other 17 species of *Atelopus*). However, because the *ignescens* group exhibits only the plesiomorphic condition, the group is a privative assemblage whose monophyly must be assumed. Long- and short-legged species occur within each group with little evidence that these are more than phenetic clusters ill-separated from one another (as acknowledged by PETERS, 1973).

RESUMEN

Se nomina una especie nueva de *Atelopus* de los bosques nublados de la falda occidental de la Cordillera Oriental en el Departamento de Cundinamarca en Colombia. La especie nueva carece de un patrón, pero parece tener parentescos con *A. pedimarmoratus* Rivero, 1963 y *A. subornatus* Werner, 1899. *Atelopus echeverrii* Rivero & Serna, 1986 es tratado como un sinónimo de *A. subornatus*. Se propone agrupar a las especies de *Atelopus* que han perdido la falange terminal del pulgar en el grupo de especies *flavescens*. Las especies que tienen dos falanges en el pulgar se agrupan en el grupo *ignescens*.

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LITERATURE CITED

CANNATELLA, D. C., 1981. — A new *Atelopus* from Ecuador and Colombia. *J. Herpet.*, **15**: 133-138.

---- 1986. — A new genus of bufonid (Anura) from South America and phylogenetic relationships of the Neotropical genera. *Herpetologica*, **42**: 197-205.

COCHRAN, D. M. & GOIN, C. J., 1970. — Frogs of Colombia. *Bull. U. S. nat. Mus.*, **288**: 1-655.

DINGERKUS, G. & UHLER, L. D., 1977. — Enzyme clearing of Alcian Blue stained whole small vertebrates for demonstration of cartilage. *Stain Technol.*, **52**: 229-232.

FROST, D. R. (ed.), 1985. — *Amphibian species of the world*. Lawrence, Allen Press & Assoc. Syst. Coll.: [i-iv] + i-v + 1-732.

GRAY, P. & CANNATELLA, D. C., 1985. – A new species of *Atelopus* (Anura, Bufonidae) from the Andes of northern Peru. *Copeia*, **1985**: 910-917.

HOOGMOED, M. S., 1987. – New *Osornophryne* (Amphibia: Anura: Bufonidae) from the Atlantic versant of the Andes in Ecuador. *Zool. Meded.*, **61**: 209-242.

LA MARCA, E., 1983. – A new frog of the genus *Atelopus* (Anura Bufonidae) from a Venezuelan cloud forest. *Contrib. Biol. Geol. Milwaukee Publ. Mus.*, **54**: 1-12.

LA MARCA, E., GARCIA-PEREZ, J. E & RENJIFO, J , 1990 – Una nueva especie de *Atelopus* (Amphibia: Anura: Bufonidae) del paramo de Tamá, Estado Apuré, Venezuela. *Caldasia*, **16** (76) 97-104

LESCURE, J., 1973. Contribution à l'étude des amphibiens de Guyane francaise. I Notes sur *Atelopus flavescens* Duméril et Bibron et description d'une nouvelle espèce. *Vie Milieu*, **23**: 125-141.

----- 1976. – Contribution à l'étude des amphibiens de Guyane francaise. VI Liste préliminaire des Anoures. *Bull. Mus. nat. Hist. nat.*, (3), **377** (Zool. 265): 475-525.

LÖTTERS, S., 1989 – Revalidierung von *Atelopus subornatus* Werner, 1899. *Salamandra*, **25**: 281-290.

LYNCH, J. D., 1986. – Notes on the reproductive biology of *Atelopus subornatus*. *J. Herpet.*, **20**: 126-129.

MCDIARMID, R. W., 1971. – Comparative morphology and evolution of frogs of the Neotropical genera *Atelopus*, *Dendrophryniscus*, *Melanophryniscus*, and *Oreophrynella*. *Los Angeles County nat. Hist. Mus. Sci. Bull.*, **12**: 1-66.

----- 1973 – A new species of *Atelopus* (Anura, Bufonidae) from northeastern South America. *Contrib. Sci. Los Angeles County Mus. nat. Hist.*, **240**: 1-12.

MYERS, C. W & DUELLMAN, W E., 1982 – A new species of *Hyla* from Cerro Colorado, and other tree frog records and geographical notes from western Panama. *Amer Mus. Novit.*, **2752** 1-32.

PETERS, J. A., 1973 – The frog genus *Atelopus* in Ecuador (Anura: Bufonidae). *Smithsonian Contrib. Zool.*, **145**. 1-49.

RIVERO, J. A., 1963. – Five new species of *Atelopus* from Colombia, with notes on other forms from Colombia and Ecuador. *Caribb. J. Sci.*, **3**: 103-124.

RIVERO, J. A. & SERNA, M. A., 1986. Nota sobre el *Atelopus nicefori* Rivero, con la descripción de una nueva especie de *Atelopus* (Amphibia: Bufonidae) de Colombia *Caribb J Sci.*, **21**: 79-82.

RUEDA-ALMONACID, J. V. & HOYOS, J M., 1991. – *Atelopus muisca*, nueva especie de anfibio (Anura: Bufonidae) para el Parque Nacional Natural Chingaza, Colombia. *Trianea*, **4**: 471-480.

RUIZ-CARRANZA, P M. & HERNANDEZ-CAMACHO, J I., 1976 – *Osornophryne*, genero nuevo de anfibios bufonidos de Colombia y Ecuador. *Caldasia*, **11** (54): 93-148

----- 1978 – Una nueva especie colombiana de *Atelopus* (Amphibia: Bufonidae). *Caldasia*, **12** (57): 181-197.

RUIZ-CARRANZA, P. M , HERNANDEZ-CAMACHO, J I. & ARDILA, M. C., 1988. – Una nueva especie de *Atelopus* A. M. C. Duméril & Bibron 1841 (Amphibia: Bufonidae) de la Cordillera Oriental de Colombia. *Trianea*, **1**: 57-69.

SAVAGE, J M , 1972. The harlequin frogs, genus *Atelopus*, of Costa Rica and western Panama. *Herpetologica*, **28**: 77-94.

WERNER, F., 1899. – Ueber Reptilien und Batrachier aus Columbien und Trinidad *Verh. Zool.-bot. Gesell. Wien*, **49**: 470-484.

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